General Information
PHYS 101 Laboratory

> "The truth is, the science of Nature has been too long made only a work of the brain and the fancy. It is now high time that it should return to the plainness and soundness of observations on material and obvious things."
>
> R. Hooke

LABORATORY OBJECTIVES

The laboratory work associated with Physics 101 has two principal goals: To give you hands-on experience with the phenomena and models you will study in class; to develop basic experimental and analytic skills that will be used throughout your career in the sciences or engineering.

The laboratory exercises that you will do here are not "experiments", in the sense of forays into the unknown designed and executed by an intrepid young scientist (you). Rather, they were chosen to illustrate physical phenomena, ingenious techniques or useful methods. They were not intended to be extremely precise, and your results will be far from exact. You will be evaluated on your understanding of the material and your approach to problems, not merely the precision of your results, and you should allocate your effort accordingly.

As one of the earliest laboratory courses in your career at Rice, PHYS 101 will emphasize very basic skills. You should develop the ability to:

1. carry out common laboratory procedures correctly and safely;
2. make measurements and report your results in physically meaningful form, including estimates of uncertainties where appropriate;
3. recognize when equipment or procedures are not working, and undertake logical corrective action.

You will also have the opportunity to communicate your results in the form of short reports on each experiment. To see how these goals fit into the overall laboratory program at Rice, you can consult the overview of laboratory objectives at http://www.owlnet.rice.edu/~labgroup/.

LABORATORY ORGANIZATION

Your laboratory session will meet for three hours for each experiment that is scheduled. In the lab, you and your partner will use the time to collect and analyze the data for the experiment, and to each prepare a brief report of your results.

Attendance at the laboratory session is mandatory. There is no lab make-up for the summer session.

DATA TAKING

It will be difficult to complete a lab if you have not read over the experiment before class. As you read, try to "think through" the experiment in order to decide what quantities you will vary, how the data should be plotted, and what you think the results should be. You may also want to lay out the data tables you think you will need, and make note of useful formulae. Remember to bring a calculator to class.

Once the apparatus is set up, you can start taking data. You and your partner will often need to work together to get the data and record it efficiently. In any case, you should both try all phases of the experiment, rather than becoming specialists. If at all possible, make a plot of the data as you go along. Your graph will very quickly tell you if the data are reasonable, if the parameters are being varied enough, and if the apparatus is working.

The apparatus you are using, although relatively simple, is remarkably expensive. Please be gentle so that neither you nor the apparatus is damaged. Particularly delicate or hazardous operations are noted in the lab manual as they occur. Please heed the warnings. If a piece of equipment does malfunction, please tell the instructor so it can be tagged for repair. We usually have a spare with which you can finish the lab.

REPORTS

A template will be provided for each exercise. Record the data as indicated, attach supporting plots, and answer the questions posed.

The laboratory assistants have been instructed to collect all reports at the end of the lab session. Only one report from each group will be graded although a report from every student will be collected. It is important that everyone in your group understands the experiment and submits a competent report. Your grade may be dependent on the contents of your group partners' report. Also, it is important that every report from the group contains the name of every student in the group. Your report will be returned to you at the next regular meeting with your group's grade.

GRADES

The lab grade is based on performance during lab sessions and quality of the lab reports. The resulting score will be reported to the lecturer as your grade for the laboratory portion of PHYS 101. The lab grade accounts for 15% of a student's total grade for PHYS 101. However, if a student's total lab grade fells below 50%, then the student will automatically fail the entire

PHYS 101 course. Grading is a necessary evil but you should be aware that most students do reasonable work and get good scores. A good grade is not, therefore, the most valuable thing you can get from this course.